

What is claimed is:

1. A rotary encoder comprising: a fixed section; a rotating section which can be rotated with reference to the fixed section; angle detecting means for detecting a rotation angle of the rotating section with reference to a predetermined reference position of the rotating section; and output means for outputting the detected angle, wherein, when the angle detecting means detects an angle  $\theta_n = n \times \theta_s$  ( $n = 1, 2, \dots, N$  (where  $N \times \theta_s = 360^\circ$ )) which is an integer multiple of a predetermined angle  $\theta_s$  ( $\theta_s \geq$  output resolution) such that the rotating section is rotated, an angle error  $E(\theta_n)$  included in the detected angle  $\theta_n$  is measured, functions between the detected angles  $\theta_n$  and errors  $E(\theta_n)$  are defined by the following equation with respect to all  $n$ :

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$$E(\theta_n) = \sum_{i=1}^{N/2} A_i \cdot \sin(i\theta_n + \phi_i)$$

an amplitude  $A_i$  and an initial phase  $\phi_i$  ( $i = 1, 2, \dots, N/2$  or  $(N-1)/2$ ) are calculated such that all the defined equations are satisfied, storing means for storing an error function which is given by the following equation:

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$$E(\theta) = \sum_{i=1}^{N/2} A_i \cdot \sin(i\theta + \phi_i)$$

and which is a periodic function of a detected angle  $\theta_a$  having

the calculated amplitude  $A_i$  and the calculated initial phase  $\phi_i$  as coefficients is arranged, the detected angle  $\theta_a$  detected by the angle detection means is substituted for the variables  $\theta$  in the equation of the error function  $E(\theta)$  stored by the storing means, and a value obtained by subtracting the value  $E(\theta_a)$  obtained by the substitution from the detected angle  $\theta_a$  is outputted by the output means.

2. A rotary encoder comprising: a fixed section; a rotating section which can be rotated with reference to the fixed section; angle detecting means for detecting a rotation angle of the rotating section with reference to a predetermined reference position of the rotating section; and output means for outputting the detected angle, wherein, when the angle detecting means detects an angle  $\theta_n = n \times \theta_s$  ( $n = 1, 2, \dots, N$  (where  $N \times \theta_s = 360^\circ$ )) which is an integer multiple of a predetermined angle  $\theta_s$  ( $\theta_s \geq$  output resolution) such that the rotating section is rotated, an angle error  $E(\theta_n)$  included in the detected angle  $\theta_n$  is measured, combinations between the detected angles  $\theta_n$  and errors  $E(\theta_n)$  are defined by the following equation with respect to all  $n$ :

$$E(\theta_n) = \sum_{i=1}^{N/2} A_i \cdot \sin(i\theta_n + \phi_i)$$

an amplitude  $A_i$  and an initial phase  $\phi_i$  ( $i = 1, 2, \dots, N/2$  or  $(N-1)/2$ ) are calculated such that all the defined equations are

satisfied, storing means for storing an error function which is given by the following equation:

$$E(\theta) = \sum_{i=1}^m A_{k_i} \cdot \sin(k_i \theta + \phi_{k_i})$$

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and which is a periodic function of the detected angle  $\theta_a$  having at least one amplitude  $A_{k1}, A_{k2}, \dots, A_{km}$  and at least one initial phase  $\phi_{k1}, \phi_{k2}, \dots, \phi_{km}$  ( $k1, k2, \dots, km$  is at least one of natural numbers from 1 to  $N/2$  or  $(N - 1)/2$ ) of the  
10 calculated amplitudes  $A_i$  and the calculated initial phases  $\phi_i$  as coefficients is arranged, the detected angle  $\theta_a$  detected by the angle detection means is substituted for the variables  $\theta$  in the equation of the error function  $E(\theta)$  stored by the storing  
15 means, and a value obtained by subtracting the value  $E(\theta_a)$  obtained by the substitution from the detected angle  $\theta_a$  is outputted by the output means.